Contribution ID: **60** Type: **Oral talk**

Constraining Bosonic Dark Matter-Baryon Interactions from Neutron Star Collapse

Friday, 31 May 2024 13:30 (25 minutes)

Dark matter (DM) may be captured around a neutron star (NS) through DM-nucleon interactions. We observe that the enhancement of such capturing is particularly significant when DM-nucleon scattering cross-section depends on the relative velocity and/or momentum transfer. This increment could potentially lead to the formation of a black hole within the typical lifetime of the NS. As the black hole grows through the accretion of matter from the NS, it ultimately results in the collapse of the host. Utilizing the existing pulsar data J0437-4715 and J2124-3858, we derive the stringent constraints on the DM-nucleon scattering cross-section across a broad range of DM masses.

Paper info

arXiv:2404.07187 [hep-ph]

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Session Classification: Astrophysics